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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/775,874

02/10/2004

Colin G. Maher

2003-0694.02

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7590

02/23/2006

LEXMARK INTERNATIONAL, INC.
INTELLECTUAL PROPERTY LAW DEPARTMENT
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EXAMINER

SOLOMON, LISA

ART UNIT

PAPER NUMBER

2861

DATE MAILED: 02/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

HA

Office Action Summary	Application No.		Applicant(s)	
	10/775,874		MAHER ET AL.	
	Examiner		Art Unit	
	Lisa M. Solomon		2861	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-8 and 11-31 is/are rejected.
- 7) ☒ Claim(s) 5,9 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 December 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>12/10/2004</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: reference sign B designating the direction in fig. 6 (page 7, line 18), reference signs (NA) and (NC) (pg. 7, line 26 and pg. 8, line 17), and reference sign 66 designating the printhead in fig. 7 (page 9, line 4). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: there are no units of measurement for the range of distance F_2 (page 7, lines 23-24) and no units of measurement for the range of distance or spacing G_2 (page 7, line 25).

Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (6,523,935) in view of Komplin et al. (6,106,096) and Alfekri et al (6,957,886).

5. In regards to claims 1-2, Torgerson et al. (935') discloses a printhead with a substrate including ink feed edge, ink ejection actuators (40), nozzle plate (13) with nozzles (21), and nozzle pitch in the range of 1/300 inch to 1/600 inch, which corresponds to 1200 dpi and 2400 dpi respectively. Torgerson et al. (935') also discloses ink chambers (19), ink channels (29) and ink feed slots (71) formed in an film layer (12) attached to the substrate, the nozzle plate is attached to this layer and heater resistors used as ink ejection actuators (40) [Column 2 lines 54-56; 58-60, Column 3 lines 15-16; 20-22; 33-47, Column 4 lines 53-58; 62-Column 5 line 10]. Torgerson et al. (935') does not disclose whether the film layer is thin or thick.

6. Komplin et al. (096') teaches a printhead including semiconductor substrate, thick polymeric layer capable of containing ink chambers and ink channels, and nozzle plate attached to the polymeric layer [Column 1 lines 50-53; 54-58].

7. The prior art, Torgerson et al. (935') suggests that the structure of a printhead include a film layer attached to a substrate and then a nozzle plate attached thereupon.

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Although, the specific thickness of the film layer is not expressed in Torgerson et al. (935') it would be obvious to make this layer thick as is known in the art as shown by Komplin et al. (096') thus one would be motivated to provide a thick film to accommodate the ink flow features.

8. Torgerson et al. (935') and Komplin et al. (096') do not disclose the ink ejection actuators (already determined to include heater resistors) to have an aspect ratio in the range set forth by the claim.

9. The specification of the pending application (10/775,874) states in paragraph 8, lines 3-4 that the term "aspect ratio" was to be read as the ratio of the length of the ink ejection actuators to the width of the ink ejection actuators.

10. Alfekri et al. (886') does not explicitly express the aspect ratio in the range as set forth in the claim. However, Alfekri et al. (886') still reads on the claim in that the range 1.5:1 to 6:1 suggests that the ink ejection actuators must be longer than they are wide [See figure 6, elements 76, 78, 80, 82].

11. It would have been obvious to one ordinary skill to modify the inventions of Torgerson et al. (935') and Komplin et al. (096') to employ the aspect ratio in the ratio as set forth in the claim for the purposes of providing uniform heating throughout the printhead.

12. Claims 3-4, 6-8, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (6,523,935).

13. In regards to claim 3, Torgerson et al. (935') discloses that the ink ejection actuators have a nozzle pitch of 1/300 inch to 1/600 inch, which yields up to 1200 dpi

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and up to 2400 dpi respectively, based on the disclose pitch the width of the resistors (56) would have to be 15 microns or less [Column 4 lines 53-58 and Column 5 lines 6-11].

14. In regards to claim 4, Torgerson et al. (935') discloses the heater resistors (56) have a resistance of at least 100 ohms [Column 3 lines 47-49].

15. In regards to claims 6-8 and 11 Torgerson et al. (935') discloses the ink feed edge comprises an ink feed slot (71), and wherein the plurality of ink ejection actuators (40) are disposed on both sides of the ink feed slot (71), the ink feed edge comprises an ink feed slot (71), and wherein the semiconductor substrate (11) contains two or more ink feed slots (71), and the plurality of ink ejection actuators (40) are disposed only on one side of each of the ink feed slots (71) [Column 4 lines 31-32; 35-36; 39-41 and see Fig. 4 elements 40,71]. Torgerson et al. (935') also discloses an inkjet printer cartridge (150,152) using the printhead (154,156) disclosed [Column 10 lines 39-42 and see Fig. 11 elements 150,152 and 154,156].

16. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (935') in view of Powers et al. (6,283,584) and Alfekri et al. (6,957,886)

17. In regards to claim 12-13, Torgerson et al. (935') discloses a printhead with a substrate including ink feed edge, ink ejection actuators (40), nozzle plate (13) with nozzles (21), and nozzle pitch in the range of 1/300 inch to 1/600 inch, which corresponds to 1200 dpi and 2400 dpi respectively. Torgerson et al. (935') also discloses ink chambers (19), ink channels (29) and ink feed slots (71) formed in an film layer (12) attached to the substrate, the nozzle plate is attached to this layer and heater

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resistors used as ink ejection actuators (40) [Column 2 lines 54-56; 58-60, Column 3 lines 15-16; 20-22; 33-47, Column 4 lines 53-58; 62-Column 5 line 10]. Torgerson et al. (935') does not disclose the absence of a film layer (12).

18. Powers et al. (584') teaches the absence of a thick film layer, a nozzle plate attached to the substrate, and the nozzle plate containing flow features such as ink chambers, ink channels, and nozzles [Column 2 lines 30-41].

19. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the printhead structure of Torgerson et al. (935') by removing the thick film layer and attaching the nozzle plate directly to the substrate as taught by Powers et al. (584') for the purposes of simplifying the manufacturing process.

20. Torgerson et al. (935') and Powers et al. (584') do not disclose the ink ejection actuators (already determined to include heater resistors) to have an aspect ratio in the range set forth by the claim.

21. The specification of the pending application (10/775,874) states in paragraph 8, lines 3-4 that the term "aspect ratio" was to be read as the ratio of the length of the ink ejection actuators to the width of the ink ejection actuators.

22. Alfekri et al. (886') does not explicitly express the aspect ratio in the range as set forth in the claim. However, Alfekri et al. (886') still reads on the claim in that the range 1.5:1 to 6:1 suggests that the ink ejection actuators must be longer than they are wide [See figure 6, elements 76, 78, 80, 82].

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23. It would have been obvious to one ordinary skill to modify the inventions of Torgerson et al. (935') and Powers et al. (584') to employ the aspect ratio in the ratio as set forth in the claim for the purposes already presented above.

24. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (935') in view of Powers et al. (096') and Fleischer (3,861,598).

25. In regards to claim 14, neither Torgerson et al. (935') nor Powers et al. (584') disclose bicircular nozzle holes in the nozzle plate.

26. Fleischer (598') discloses nozzles having different cross-sections including rectangular, square, triangle, oval, and round cross-sections [Column 7 lines 1-11].

27. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify both the inventions of Torgerson et al. (935') and Powers et al. (584') to employ one of the cross-section taught by Fleischer (598') in particular the oval cross-sections for the purposes of improved ink distribution.

28. Claims 15-19 rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (6,523,935).

29. In regards to claims 15-19, Torgerson et al. (935') discloses the ink feed edge comprises an ink feed slot (71), and wherein the plurality of ink ejection actuators (40) are disposed on both sides of the ink feed slot (71), the ink feed edge comprises an ink feed slot (71), and wherein the semiconductor substrate (11) contains two or more ink feed slots (71), and the plurality of ink ejection actuators (40) are disposed only on one side of each of the ink feed slots (71) [Column 4 lines 31-32; 35-36; 39-41 and see Fig. 4 elements 40,71]. Torgerson et al. also discloses an inkjet printer cartridge (150,152)

using the printhead (154,156) disclosed [Column 10 lines 39-42 and see Fig. 11 elements 150,152 and 154,156].

30. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (935') in view of Komplin et al (096') and Alfekri et al. (6,957,886).

31. In regards to claim 20, Torgerson et al. (935') discloses a printhead with a substrate including ink feed edge, ink ejection actuators (40), nozzle plate (13) with nozzles (21), and nozzle pitch in the range of 1/300 inch to 1/600 inch, which corresponds to 1200 dpi and 2400 dpi respectively. Torgerson et al. (935') also discloses ink chambers (19), ink channels (29) and ink feed slots (17) formed in a film layer (12) attached to the substrate, the nozzle plate is attached to this layer and heater resistors used as ink ejection actuators (40) [Column 2 lines 54-56; 58-60, Column 3 lines 15-16; 20-22; 33-47, Column 4 lines 53-58; 62-Column 5 line 10]. Torgerson et al. (935') does not disclose whether the film layer is thin or thick.

32. Komplin et al. (096') teaches a printhead including semiconductor substrate, thick polymeric layer capable of containing ink chambers and ink channels, and nozzle plate attached to the polymeric layer [Column 1 lines 50-53; 54-58].

33. The prior art, Torgerson et al. (935') suggests that the structure of a printhead include a film layer attached to a substrate and then a nozzle plate attached thereupon. Although, the specific thickness of the film layer is not expressed in Torgerson et al. (935') it would be obvious to make this layer thick as is known in the art as shown by Komplin et al. (096') thus one would be motivated for the reasons already presented above.

34. In regards to claim 21, Torgerson et al. (935') and Komplin et al. (096') do not disclose the ink ejection actuators (already determined to include heater resistors) to have an aspect ratio in the range set forth by the claim.

35. The specification of the pending application (10/775,874) states in paragraph 8, lines 3-4 that the term "aspect ratio" was to be read as the ratio of the length of the ink ejection actuators to the width of the ink ejection actuators.

36. Alfekri et al. (886') does not explicitly express the aspect ratio in the range as set forth in the claim. However, Alfekri et al. (886') still reads on the claim in that the range 1.5:1 to 6:1 suggests that the ink ejection actuators must be longer than they are wide. [See figure 6, elements 76, 78, 80, 82].

37. It would have been obvious to one ordinary skill to modify the inventions of Torgerson et al. (935') and Powers et al. (584') to employ the aspect ratio in the ratio as set forth in the claim for the purposes already presented above.

38. Claims 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (6,523,935).

39. In regards to claims 22-25, Torgerson et al. (935') discloses the ink feed edge comprises an ink feed slot (71), and wherein the plurality of ink ejection actuators (40) are disposed on both sides of the ink feed slot (71), the ink feed edge comprises an ink feed slot (71), and wherein the semiconductor substrate (11) contains two or more ink feed slots (71), and the plurality of ink ejection actuators (40) are disposed only on one side of each of the ink feed slots (71) [Column 4 lines 31-32; 35-36; 39-41 and see Fig. 4 elements 40,71]. Torgerson et al. (935') also discloses an inkjet printer cartridge

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(150,152) using the printhead (154,156) disclosed [Column 10 lines 39-42 and see Fig. 11 elements 150,152 and 154,156].

40. Claims 26-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (935) in view of Powers et al. (584') and Alfekri et al. (6,957,886).

41. In regards to claim 26, Torgerson et al. (935') discloses a printhead with a substrate including ink feed edge, ink ejection actuators (40), nozzle plate (13) with nozzles (21), and nozzle pitch in the range of 1/300 inch to 1/600 inch, which corresponds to 1200 dpi and 2400 dpi respectively. Torgerson et al. (935') also discloses ink chambers (19), ink channels (29) and ink feed slots (71) formed in a film layer (12) attached to the substrate, the nozzle plate is attached to this layer and heater resistors used as ink ejection actuators (40) [Column 2 lines 54-56; 58-60, Column 3 lines 15-16; 20-22; 33-47, Column 4 lines 53-58; 62-Column 5 line 10]. Torgerson et al. (935') does not disclose the absence of a film layer.

42. Powers et al. (584') teaches the absence of a thick film layer, a nozzle plate attached to the substrate, and the nozzle plate containing flow features such as ink chambers, ink channels, and nozzles [Column 2 lines 30-41].

43. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the printhead structure of Torgerson et al. (935') by removing the thick film layer and attaching the nozzle plate directly to the substrate as taught by Powers et al. (584') for the purposes already presented above.

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44. In regards to claim 27, Torgerson et al. (935') and Powers et al. (584') do not disclose the ink ejection actuators (already determined to include heater resistors) to have an aspect ratio in the range set forth by the claim.

45. The specification of the pending application (10/775,874) states in paragraph 8, lines 3-4 that the term "aspect ratio" was to be read as the ratio of the length of the ink ejection actuators to the width of the ink ejection actuators.

46. Alfekri et al. (886') does not explicitly express the aspect ratio in the range as set forth in the claim. However, Alfekri et al. (886') still reads on the claim in that the range 1.5:1 to 6:1 suggests that the ink ejection actuators must be longer than they are wide [See figure 6, elements 76, 78, 80, 82].

47. It would have been obvious to one ordinary skill to modify the inventions of Torgerson et al. (935') and Powers et al. (584') to employ the aspect ratio in the ratio as set forth in the claim for the purposes already presented above.

48. Claims 28-31 rejected under 35 U.S.C. 103(a) as being unpatentable over Torgerson et al. (6,523,935).

49. In regards to claims 28-31, Torgerson et al. (935') discloses the ink feed edge comprises an ink feed slot (71), and wherein the plurality of ink ejection actuators (40) are disposed on both sides of the ink feed slot (71), the ink feed edge comprises an ink feed slot (71), and wherein the semiconductor substrate (11) contains two or more ink feed slots (71), and the plurality of ink ejection actuators (40) are disposed only on one side of each of the ink feed slots (71) [Column 4 lines 31-32; 35-36; 39-41 and see Fig. 4 elements 40,71]. Torgerson et al. (935') also discloses an inkjet printer cartridge

(150,152) using the printhead (154,156) disclosed [Column 10 lines 39-42 and see Fig. 11 elements 150,152 and 154,156].

Allowable Subject Matter

50. Claims 5 and 9-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

51. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not suggest or teach nozzle "holes having a long axis to diameter ratio greater than about 1.15" or "distance from the ink ejection actuators to exit of the nozzle holes is greater than the pitch" or "ratio of the pitch to a distance" of ink ejection actuators to the exit of the nozzle holes "range from about 0.5 to about 1.5" as set forth in the claims above.

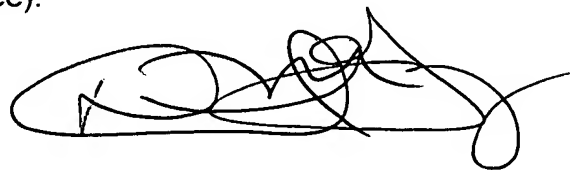
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lisa M. Solomon whose telephone number is (571) 272-1701. The examiner can normally be reached on 8:00 am - 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David M. Gray can be reached on (571) 272-2119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'David Gray', with a large, stylized flourish extending from the end.

David Gray
Primary Examiner

LMS
2/21/2006